

PROBLEMS OF WATER SUPPLY.

The Geology of Water Supply. By Horace B. Woodward, F.R.S. Pp. xii+339. (London: Edward Arnold, 1910.) Price 7s. 6d. net.

THE geology of water supply is one of those applied subjects which are extremely difficult to treat of adequately within the limits of a small volume, inasmuch as geology constitutes only one of the factors which have to be taken into consideration, and the part which it plays varies with so great uncertainty that each individual case must be dealt with practically on its merits. It may be said at once, however, that we have here an extremely useful book, one which sets forth with great clearness the main geological features to be recognised by the engineer, chemist, or physical geographer when confronted with a problem of water supply, and indicates to him the critical point where the geological doctor must be sent for. The examples quoted in illustration of general principles are naturally mostly taken from the British Isles, but there are many of great interest from other parts of the world, particularly from the United States and the British Dominions beyond the Seas.

After an introductory chapter and some general remarks on rainfall and atmospheric impurities, the author states some general geological considerations, and proceeds to describe the modes of dispersal of rain on the surface and underground, special reference being made to rivers and underground channels, swallow holes, pipes, bournes, dumb-wells, and springs. Then follows a chapter on surface sources of supply, which include storage of rain-water, supplies from springs, streams, and rivers, ponds, dew-ponds, and lakes and reservoirs. The geological interest increases in the next chapter, on underground sources of water supply—wells of all kinds—and then follow three chapters on the water-bearing strata of England, working backwards through the geological record. The succeeding chapter, on prospecting for water, applies the information already provided to the selection of sites for wells and borings, having regard to the quantity and quality of water required, the geological uncertainties underground, and, incidentally, to the belief that trustworthy aid can be obtained from various methods of water divining. This is, in our opinion, the most valuable chapter in the book; the hints as to the examination of particular districts and the diagrams illustrating local peculiarities which may be met with are extremely clear, and will form a useful warning to the non-expert of the danger of trusting too much to apparent simplicity of structure.

The next section of the book concerns itself with the water supply in polar, arid, and other regions, and in islands, where special conditions arise; a non-geological chapter refers shortly to the quality of water and the examination thereof by chemical and bacteriological analysis; and, lastly, we have a chapter of great interest on mineral waters, *i.e.* waters which contain in solution more than the 60 or 70 grains per gallon which marks the "potable" limit.

A final chapter adds to the growing body of evidence

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which may one day be deemed sufficient to justify the constitution of a National Water Board, which would enable "the various independent authorities dealing with the conservancy of rivers, with canals, drainage, sanitary matters, and water supply," to act to some extent in concert.

A useful glossary and bibliography and a satisfactory index are appended.

In reviewing a suggestive book of this kind it would, of course, be easy to embark upon a discussion of many things which, as the author is always careful to point out when he comes to them, are still largely matters of opinion, but space forbids more than the mere laying of emphasis upon one or two points. We note the need for further investigation of the conditions of percolation, and the solvent action of water in a permeable formation such as limestone. Where the limestone formation is exposed it would seem that, the solvent power of the percolating water being quickly lost, solution takes place chiefly along cracks or joints, which are opened out into fissures, caves or underground channels being formed where the rock material is strong, and subsidence occurring where it is weak; but where the permeable formation is overlain by an impermeable, it appears that percolation takes place with great slowness, and water obtained by boring through the upper strata is not quickly replaced from a distance. The analytical work of Mr. W. W. Fisher and Dr. J. C. Thresh in the oolites in Oxfordshire and the chalk under London is extremely significant; it suggests important conclusions in connection with, *e.g.* the lowering of the water-table under London, the outflow of water from the chalk in Kent and Hertfordshire and in other parts of England where similar structures occur.

With regard to maps showing underground contours, we agree that contours delineating the upper surface of covered water-bearing formations are valuable, and that an extension of work similar to that of Mr. W. H. Dalton is desirable. But we think that Mr. Woodward underestimates the usefulness of maps representing underground water-contours, which give much information as to the direction of flow of underground water and its variations from time to time under varying rainfall and pumping.

We note few slips, but it may be worth pointing out that the New River derives much of its supply from an intake from the Lea, and the Glencorse reservoirs largely supplement the Crawley springs in contributing water from the Pentland Hills and Edinburgh.

H. N. D.

PARASITISM.

Survival and Reproduction: a new Biological Outlook.

By H. Keinheimer. Pp. x+410. (London: J. M. Watkins, 1910.) Price 7s. 6d. net.

THE plentifully quoted pages from the writings of Darwin, Kropotkin, and others contained within the structure of this book form far more than its skeleton. Their presence justifies the statement that the work contains many luminous passages and much translucent information.

That part of the work which spatially connects the

unmistakably clear words of penetrative genius and the brilliantly faceted phrases of clever men, and which is contributed by the author, is, however, of another kind: rather fluorescent than luminous, and by no means transparent.

Not that the author is without some literary deftness and incapable of pressing home a plain fact in a convincing manner. Thus, for instance, where he acknowledges his indebtedness for embodying so large a part of Geddes and Thompson's well-known work on "Sex and Evolution," explaining that it would be mere presumption on his part to attempt to do again what they have already done far better than he could do. Reading the book, it is soon clear that this is true, and, as of great relevance, a truth as well stated although otherwise evident. That it is stated well no one will deny.

The author's own meaning is presumably contained in the commentary paragraphs that follow each of these lengthy quotations. The redundancy of reiterated references to "parasitism" contained within these comments is reminiscent of a well-known dialogue between two dramatists unfortunately departed to the nether-world and there contesting their respective excellences in metrical statement. Entitled to one line with which to conclude his fellow competitor's heroic verse, one candidate secures a repeated success by the use of always the same phrase, some such simple phrase as "and I lost a little oil-can."

From these reiterated comments it would appear that parasitism is responsible for many things, chiefly perhaps for "the passing of natural selection." This is by no means surprising when the author's comprehensive concept of "parasitism" is fully grasped. The term is defined as connoting

"Every condition whereby one organism lives precariously, stealthily, or indolently, i.e. retrogressively, by the work of others. In view of the dynamic interdependence of life, the epithet must also apply to all transitory phases of violation of fundamental laws of assimilation and division of labour, even the highest and most strenuous organisms occasionally being guilty of such transgressions."

To this definition there are, however, so many numbered corollaries that "parasitism" is by no means understood until wider reference is made. Briefly, let it be said that there is the whole work to refer to.

Herbert Spencer, so it would seem, has anticipated this intellectual venture in a somewhat remarkable manner. Thus the author quotes his explanation of the limits to cell-growth in terms of an increasing disparity between mass and surface, and appends the following comment: "Herbert Spencer here very lucidly, though unwittingly, states the case of pathology and parasitism, and consequent limitations."

The author deliberately stating this case, so it would seem, is by no means so clear, and as a consequence places difficulties in the way of that criticism which he foresees apparently without fearing.

"Anyone honestly wishing to challenge my views is, of course, very welcome to do so. But if criticism is to be effective, it must state categorically in what

particulars I am wrongly interpreting observed facts, and must also show that my physiological position is unsound."

This statement may become more pregnant when the author has detailed these particulars, and provided a view of his physiological position.

J. S. MACDONALD.

THE DIVINING ROD.

Graf Carl v. Klinckowstroem. *Bibliographie der Wünschelrute*. Mit einer Einleitung von Dr. Ed. Aigner: der gegenwärtige stand der Wünschelrutens-Forschung. Pp. 146. (München: Ottmar Schön-huth Nachf., 1911.)

THIS book contains a fairly complete list of the various publications in regard to the divining-rod, beginning with the work of R. P. Bernhardus, published in 1532, and ending with papers issued during the current year. This list extends over 103 pages, and the contents of each book or paper are indicated by a brief note following the title of the publication.

The list is naturally more complete in respect of German publications than of any others; there is a useful index giving the names of the various authors who are mentioned. The thanks of those who are interested in the matter are due to Graf von Klinckowstroem for the care he has taken in collecting the information and presenting it in useful form. There is also an interesting introduction by Dr. Eduard Aigner, of Munich, who endeavours to sum up impartially the present condition of matters in connection with research on the action of the divining-rod. He points out quite correctly that the attitude of those who refuse to investigate the matter at all is just as absurd as that of their opponents, who are willing to accept all the claims of the "diviners" without further investigation.

Dr. Aigner also points out that a certain percentage of failures does not necessarily prove that the "diviners" do not possess the powers they claim, for if these powers have any real existence, they may be conditioned by circumstances at present unknown to us, and one may be at times asking the "diviners" to perform experiments under impossible conditions.

An explanation of the recorded successes of "diviners" is suggested, which presupposes the power of the "diviners" to recognise the difference produced in the atmosphere by the presence of water, metals, &c. The most important argument in favour of this is based on the investigations of Dr. Kurz and Prof. Gockel (*Physikalische Zeitschrift*, x., p. 845) and of T. Wulf (*idem*, x., p. 997), in which a lessening of the gamma-radiation over water is said to be proved. This lessening is said to take place over quite insignificant water-sources.

If this view were correct, it ought, of course, to be possible to produce a physical apparatus capable of replacing the "diviner," and several articles of this kind are on the market. The reviewer has applied for permission to test some of these, but he has not so far succeeded in inducing those concerned to allow him to do so. Dr. Aigner says that successes of one